B. Remarks

The claims are 1-5, with claim 1 being the sole independent claim. Reconsideration of the claims is expressly requested.

Claims 1-3 stand rejected under 35 U.S.C. § 103(a) as being allegedly obvious from U.S. Patent No. 5,204,034 (Sasame) in view of U.S. Patent No. 3,387,071 (Cahill). Claim 4 stands rejected under 35 U.S.C. § 103(a) as being allegedly obvious from Sasame in view of Cahill and further in view of U.S. Patent No. 5,840,782 (Limerkens). Claim 5 stands rejected under 35 U.S.C. § 103(a) as being allegedly obvious from Sasame in view of Cahill and further in view of U.S. Patent No. 4,980,108 (Suzuki). The grounds of rejection are respectfully traversed.

Prior to addressing the merits of rejection, Applicants would like to briefly discuss some of the features and advantages of the presently claimed invention. That invention, in pertinent part, is related to a process for producing a cleaning blade. In this process, at least a part of the surface portion of a urethane resin blade is impregnating with an isocyanate compound. After the impregnation, warm or hot air at a temperature not lower than the melting point of the isocyanate compound is blown on the blade surface to remove the isocyanate compound remaining on the surface. The urethane resin that forms the blade is allowed to react with the isocyanate compound, with which the blade stands impregnated, to form a cured layer. As result of this process, the prior art problems associated with the friction of a urethane resin blade have been overcome.

Sasame is directed to a cleaning blade with improved surface lubrication. As acknowledged by the Examiner, Sasame does not disclose or suggest using an

isocyanate compound to modify the surface of a urethane resin blade. However, the Examiner alleged that Sasame teaches a urethane resin blade, Cahill teaches incorporating an isocyanate as claimed into a urethane fiber and that it would have been obvious to modify the urethane blade in Sasame in accordance with the teachings in Cahill. Applicants strongly disagree.

Sasame, in its background section, mentions that urethane-based cleaning blades have been widely used in image forming apparatuses due to their superior abrasion resistance. However, like the present specification, Sasame recognizes that urethane cleaning blades have a high friction coefficient, which results in a high friction force between the blade and the image bearing member. Consequently, the urethane rubber cleaning blade may become inverted or may bounce on the image bearing member, thereby becoming incapable of removing the residual toner (see col. 1, lines 33-42).

Sasame then proceeds to discuss various proposed techniques for modifying urethane blades to improve its frictional qualities. For example, Sasame states that it has been proposed to coat the end portion of the urethane rubber cleaning blade or the surface of the image bearing member with lubricating powder of fluorinated resin, such as polyvinylidene fluoride (PVDF) or polytetrafluoroethylene (PTFE). However, Sasame concludes that such a modification is insufficient, because the use of the lubricant may, for example, deteriorate image quality (see col. 1, lines 43-60).

Another proposed modification of a urethane blade discussed in Sasame involves dispersing the lubricant in the urethane material. However, Sasame also concludes that such a modification is unsatisfactory as it only results in the presence of the

lubricant locally on the surface and cannot prevent inversion or bouncing of the urethane blade. Furthermore, Sasame states that thermosetting liquid urethanes are unsuitable for mass production, since they require a long reaction time for thermosetting to take place and have a high reactivity with moisture in the air (see col. 1, line 61 - col. 2, line 4).

Thus, in order to solve the frictional problems associated with urethane cleaning blades, Sasame teaches replacing the urethane material with one that has a lower coefficient of friction and faster thermosetting time. One such material is silicon rubber (see col. 2, lines 5-12).

In sum, Sasame teaches that urethane blades cannot be modified in order to overcome the friction problems to achieve satisfactory results, and that another material must be used in lieu of the urethane. Thus, Sasame explicitly teaches away from using a urethane resin for the cleaning blade, and there is no motivation to modify the urethane as disclosed in Cahill, nor is there be any reasonable expectation of success based on the disclosure in both of these references.

Cahill is directed to modified urethane fibers. Specifically, Cahill teaches how to modify urethane fibers to improve their heat resistance, toxic properties and elasticity (see col. 1, lines 43-56). Cahill is silent with respect to the friction properties of urethanes, and is not understood to teach that the modifications disclosed therein have any effect on friction.

Thus, clearly, there is no motivation to apply the modification of a fiber disclosed in Cahill to a cleaning blade disclosed in Sasame. Sasame teaches that urethane blades cannot be modified with satisfaction to overcome existing problems. Cahill lends

no further suggestion that these problems can be overcome. The advantages sought in Cahill (e.g., flexibility and heat resistance) are already present to a satisfactory degree in urethane cleaning blades (see current specification, page 1, lines 19-21). These additional improvements in Cahill are believed to specifically concern fibers, which are quite different in structure and use from cleaning blades.

This, coupled with the fact that Sasame teaches completely avoiding the use of urethane in a cleaning blade, clearly shows that the combination of Sasame and Cahill as alleged by the Examiner would not have been obvious. Furthermore, the discussion in the background section of Sasame regarding the inability to modify a urethane resin blade to achieve satisfactory results and the production problems associated with using a urethane resin in general, coupled with Cahill's focus on fibers and properties not related to urethane blade deficiencies mentioned in Sasame, clearly indicate that a skilled artisan would not have a reasonable expectation that these deficiencies could be addressed by the modification discussed in Cahill.

Furthermore, the modification of fibers disclosed in Cahill is different from the modification of urethane as presently claimed. For example, contrary to the allegation made by the Examiner, Cahill does not disclose or suggest removing the excess isocyanate by blowing hot air. In Cahill, the thread is passed through an oven to remove the solvent and excess polyamine and cure the thread in hot air. However, the removal is not conducted by blowing hot air. Cahill only teaches using a hot air atmosphere. No blowing is understood to be disclosed.

Furthermore, when the thread is impregnated with an isocyanate, it is impregnated in its entirety. However, when a blade is impregnated, the amount of the isocyanate differs in the thickness direction, resulting in formation of a cured layer. The fiber would not achieve the properties desired in Cahill if only a cured layer is formed.

In sum, it is clear that there is no motivation to combine the modification process disclosed in Cahill with the urethane cleaning blade disclosed in Sasame, nor is there a reasonable expectation of success that this combination addresses the problems with urethane resin blades raised in Sasame. Furthermore, even if these documents could be combined, the combination still fails to yield the presently claimed steps, since the modification process disclosed in Cahill is different from the presently claimed impregnation.

Limerkens cannot cure the deficiencies of Sasame and Cahill. Specifically, Limerkens is directed to microcellular elastomers, such as shoe soles. This reference fails to disclose or suggest the same features, which are missing in Sasame and Cahill, as discussed above. It does not disclose or suggest cleaning blades and provides no guidance with respect to overcoming problems associated with urethane resin blades raised in Sasame using the modification in Cahill or any other technique.

Furthermore, Limerkens even fails to disclose or suggest the feature for which it was cited by the Examiner. In particular, the Examiner alleged that Limerkens discloses the water amount recited in present claim 4. However, as the Examiner will appreciate, the water in the reactive system in Limerkens is used as a foaming agent, in the absence of other blowing agents, to control the density, and its ratio is based on the weight

of the entire reaction system, not just the weight of the urethane (see col. 3, lines 65-col. 4, line 4). To the contrary, the small amount of water that may be present in the urethane in accordance with the present invention is kept to a minimum to avoid foaming, which can make the blade surface uneven (see specification, page 21, line 24 - page 22, line 7).

Thus, the water content recited in Limerkens is different in kind and amount from that presently claimed. Clearly, there is no motivation to use the disclosure in Limerkens directed to water content used to foam polyurethane in the urethane blade of the present invention, in which the amount of water is minimized to avoid foaming.

Lastly, Suzuki also cannot supplement the missing teachings of the above-discussed references. Suzuki is directed to a method of forming a polyurethane coating on a biaxially oriented polyester film. Like the other references, Suzuki fails to disclose or suggest impregnation of urethane with an isocyanate to form a cleaning blade as presently claimed. It does not disclose or suggest cleaning blades and provides no guidance with respect to overcoming problems associated with urethane resin blades raised in Sasame using the modification in Cahill or any other technique.

Also, Suzuki, contrary to the allegation made by the Examiner, fails to disclose or suggest deactivating excess unreacted isocyanate groups with an active hydrogen compound. Specifically, the Examiner alleged that Suzuki teaches using aqueous ammonia to deactivate the unreacted isocyanate. However, Suzuki teaches using ammonia to neutralize a carboxyl group introduced into the polyurethane pre-polymer, not the unreacted isocyanate.

In conclusion, Applicants respectfully submit that whether considered separately or in any proper combination, the documents of record fail to disclose or suggest the presently claimed elements. Wherefore, withdrawal of the outstanding rejections and passage of the application to issue are respectfully requested.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

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